

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings of claims in the application:

Listing of Claims:

1. (Currently amended) A method of forming a trench isolation structure on a substrate, the method comprising:

applying a pad oxide layer on said substrate;

applying a polysilicon layer over said pad oxide layer;

applying an anti-reflective coating (ARC) over said polysilicon layer;

forming a photoresist on said ARC;

exposing a portion of said photoresist to a light to define a location where a trench is to be formed;

removing said photoresist at said location; and

etching, at said location, through said ARC, said polysilicon layer, said pad oxide and through a depth of said substrate to form a trench having a trench bottom at said location;

removing a remainder of the photoresist;

over filling the trench with a trench fill material, the trench fill material having a porous region located generally adjacent the ARC; and

removing a portion of the trench fill material including removing the porous region.

2. (Original) The method of claim 1 further comprising depositing a nitride layer between said polysilicon layer and said ARC, and wherein said ARC comprises a bottom anti-reflective coating (BARC).

3. (Original) The method of claim 1 wherein said ARC comprises a chemical vapor deposition anti-reflective coating (CVD ARC).

4. (Currently amended) A method of forming a trench isolation structure on a substrate, the method comprising:

applying a pad oxide layer on said substrate;

applying a polysilicon layer over said pad oxide layer;

applying a CVD anti-reflective coating (ARC) over said polysilicon layer;

forming a photoresist on said CVD ARC;

exposing a portion of said photoresist to a light to define a location where a trench is to be formed;

removing said photoresist at said location; and

etching, at said location, through said CVD ARC, said polysilicon layer, said pad oxide and through a depth of said substrate to form a trench having a trench bottom at said location;

removing a remainder of the photoresist;

over filling the trench with a trench fill material, the trench fill material having a porous region located within the trench and generally adjacent the CVD ARC; and

removing a portion of the trench fill material including removing the porous region.

5. (Original) The method of claim 4 wherein said polysilicon layer is applied with a thickness of about 400Å to about 1000Å.

6. (Original) The method of claim 4 wherein said CVD ARC is applied with a thickness of about 1000Å and about 2000Å.

7. (Canceled)

8. (Currently amended) The method of claim 4 7, wherein said filling step comprises

introducing a precursor into a substrate processing chamber containing said substrate;

flowing ozone into said substrate processing chamber to react with said precursor to deposit a dielectric layer over said substrate; and

adjusting an ozone/precursor ratio between said ozone and said precursor to regulate deposition rates of said dielectric layer on said trench bottom and said CVD ARC until said dielectric layer develops a substantially planar dielectric surface.

9. (Original) The method of claim 8 wherein said dielectric layer has a ratio of said ozone to said precursor of about 10:1 to 20:1.

10. (Canceled)

11. (Original) The method of claim 8 further comprising:
subjecting said substrate to an oxygen-containing gas; and
heating said substrate to substantially simultaneously densify said dielectric layer and to form a thermal oxide at an interface between said dielectric layer and a surface of said trench.

12. (Canceled)

13. (Currently amended) The method of claim 4 ~~12~~ wherein said removing step is a chemical mechanical polishing (CMP) step.

14. (Original) The method of claim 8 further comprising the step of generating a pressure of about 200-700 Torr and a temperature of about 300-500 degrees Celsius in said substrate processing chamber.

15. (Original) The method of claim 8 further comprising the step of controlling a pressure in said substrate processing chamber based on an ozone/precursor ratio selected during said adjusting step.

16. (Currently amended) A method of forming a trench isolation structure on a substrate, the method comprising:

applying a pad oxide layer on said substrate;
applying a polysilicon layer over said pad oxide layer;
applying a nitride layer over said polysilicon layer;
applying a bottom anti-reflective coating (BARC) over said nitride polysilicon
layer;
forming a photoresist on said BARC;
exposing a portion of said photoresist to a light to define a location where a trench
is to be formed;
removing said photoresist at said location; and
etching, at said location, through said BARC, said nitride layer, said polysilicon
layer, said pad oxide and through a depth of said substrate to form said trench at said location;
removing a remainder of the photoresist;
filling the trench with a trench fill material, the trench fill material having a
porous region located within the trench proximate a trench wall and generally aligned with the
nitride layer; and
removing a portion of the trench fill material including removing the porous
region.

17. (Original) The method of claim 16 wherein said polysilicon layer is
applied with a thickness of about 400Å to about 1000Å.

18. (Original) The method of claim 16 wherein said nitride layer is applied
with a thickness of about 800Å to about 1200Å.

19. (Canceled)

20. (Currently amended) The method of claim 16 19, wherein said filling step
comprises:
introducing a precursor into a substrate processing chamber containing said
substrate;

flowing ozone into said substrate processing chamber to react with said precursor to deposit a dielectric layer over said substrate; and

adjusting an ozone/precursor ratio between said ozone and said precursor to regulate deposition rates of said dielectric layer on said trench bottom and said CVD ARC until said dielectric layer develops a substantially planar dielectric surface.

21. (Canceled)

22. (Original) The method of claim 20 further comprising:
subjecting said substrate to an oxygen-containing gas; and
heating said substrate to substantially simultaneously densify said dielectric layer and to form a thermal oxide at an interface between said dielectric layer and a surface of said trench.

23. (Original) The method of claim 22 wherein said subjecting and heating steps form said thermal oxide to be about 200Å along a trench wall and about 400Å along said polysilicon layer.

24. (Original) The method of claim 22 wherein said heating step comprises heating said substrate to between about 800 degrees Celsius and about 1100 degrees Celsius, for about 30-40 minutes.

25. (Canceled)

26. (Currently amended) The method of claim 16 24 wherein said removing step is a chemical-mechanical polishing step

27. (New) The method as in claim 1 wherein the removing of the portion of the trench fill material produces a substantially planar trench fill layer generally devoid of the porous region.

28. (New) The method as in claim 1 wherein overfilling the trench comprises:

introducing a precursor into a substrate processing chamber containing the substrate;

flowing ozone into the substrate processing chamber to react with the precursor to deposit the trench fill material over the substrate; and

adjusting an ozone/precursor ratio between the ozone and the precursor to regulate deposition rates of the trench fill material on the trench bottom and the ARC until a substantially planar dielectric surface of trench fill material forms.

29. (New) The method as in claim 28 wherein the removing of the portion of the trench fill material, including the removing of the porous region, retains a substantially planar dielectric surface of trench fill material.

30. (New) The method as in claim 1 further comprising:
subjecting the substrate to an oxygen-containing gas; and
heating the substrate to substantially simultaneously densify a dielectric layer of trench fill material and to form a thermal oxide at an interface between the dielectric layer and a surface of said trench.

31. (New) The method as in claim 30 wherein the subjecting and the heating further forms an increased dielectric layer thickness at the polysilicon layer adjacent a trench corner.

32. (New) The method as in claim 30 wherein the subjecting and the heating is performed prior to the removing of the portion of the trench fill material including the removing of the porous region.